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TYPHLOPS LAZELLI, A NEW SPECIES OF CHINESE BLINDSNAKE FROM HONG KONG (SERPENTES: TYPHLOPIDAE)

V. WALLACH[1] AND OLIVIER S. G. PAUWELS[2]

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INTRODUCTION

The scolecophidian fauna of China, including Hong Kong and Taiwan, presently consists of four species placed in the genera *Typhlops* and *Ramphotyphlops*. Although *Typhlops diardii* Schlegel (1839) and *T. koshunensis* Oshima (1916) are restricted to southern China and Taiwan, respectively, *Ramphotyphlops albiceps* (Boulenger, 1898) and *R. braminus* (Daudin, 1803) both are known from Hong Kong (Karsen *et al.*, 1986; Zhao and Adler, 1993; Zhao *et al.*, 1998).

Typhlops (= *Ramphotyphlops*) *braminus* was first reported "on the Peak in Hongkong Island" by Wall (1903) and for many years was the only typhlopid known from there (Herklots, 1951). The

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existence of *R. albiceps* in Hong Kong was verified in 1952 based upon a specimen (BMNH 1954.1.13.4) originating from Caine Road, Hong Kong Island, as reported by Romer (1970), who also noted a second specimen (BMNH 1983.946) obtained from Caroline Hill Road, Hong Kong Island, in 1966. Taylor (1965) discussed a British Museum specimen (BMNH 1954.1.13.4) from Hong Kong that was referred to *R. albiceps* but suggested that its identity might be in error because its middorsal scales were 411 as compared with the then-known range of 301–327 in *R. albiceps*. However, a range of 307–424 middorsals has been confirmed for the species (Wallach, 1998b). Hahn (1980) later questioned the species' presence in Hong Kong, presumably based on Taylor's report. Karsen *et al.* (1986) listed *R. albiceps* for the fauna of Hong Kong based upon the two above-mentioned specimens. Lazell and Lu (1990) referred two additional Hong Kong specimens to *Typhlops* (= *Ramphotyphlops*) *albiceps*. These specimens were collected by Sandra Brown (Macklin, 1988), with one deposited at the St. Louis School (SLS 196), West Point, Hong Kong, and the other at the Museum of Comparative Zoology, Harvard University (MCZ 173290). Another specimen was collected on the Hong Kong University campus by Michael Lau in 1992; it also was deposited at the MCZ (MCZ 183578). In the most recent herpetofaunal synopsis of Hong Kong, Karsen *et al.* (1998) listed Hong Kong records of *R. albiceps* based upon five specimens, including the British Museum pair discussed above plus three that were collected in 1988 "in a patch of woodland on the slope of Mt. High West." Two of the latter represent the new species described below.

The known range of *R. albiceps* is southern Myanmar, southern Thailand, peninsular Malaysia, the Kedah and Jarak Islands in the Strait of Malacca, the Similan Islands off peninsular Thailand, and the disjunct population from Hong Kong, China (Hahn, 1980; McDiarmid *et al.*, 1999). Zhao and Adler (1993) erroneously reported *R. albiceps* from Singapore, presumably based upon Grandison (1978), but this has not been verified by Lim and Chou (1990) or Lim and Lim (1992).

All but two of the above specimens have been confirmed to represent *R. albiceps*. However, the two MCZ specimens are not

referrable to *R. albiceps* but instead represent an undescribed species.

MATERIALS AND METHODS

All specimens were examined under a binocular microscope; internal and external measurements were made to the nearest 0.5 mm with either vernier calipers or a metric ruler. Middorsal scales were counted between the rostral scale and the terminal cone. Dorsocaudals are defined as the number of vertebral scales along the tail, counted between an imaginary line perpendicular to the vent and the apical spine. The dorsocaudal count in samples usually is less variable than the count of midventral subcaudals, which often are irregularly arranged.

Visceral characters have been defined and discussed in Wallach (1985, 1993a, 1994, 1996, 1998a,b), Broadley and Wallach (1996), and Wallach and Ineich (1996). All values of organ lengths, gaps, intervals, and segments are given as percent snout–vent length (% SVL), followed only by the % sign. Organ lengths, measured as the maximum anterior–posterior distance, are followed parenthetically by the organ midpoint (MP) value, also as % SVL. Organ gaps are defined as the distance between two organs (posterior tip of cranial organ to anterior tip of caudal organ); organ intervals are defined as the distance between two organs including the length of both organs (anterior tip of cranial organ to posterior tip of caudal organ). Organ midpoint segments are defined as the distance from the midpoint of one organ to the midpoint of another organ.

The supralabial imbrication patterns (SIPs) of the Typhlopidae consist of five states, each of which is denoted by the supralabial numbers that overlap the shields dorsal to them: T-I with first supralabial overlapping preocular, T-II with second supralabial overlapping preocular or presubocular, T-III with third supralabial overlapping ocular or subocular, T-V with both second and third supralabials overlapping shields above them, and T-0 with no overlapping supralabials (Wallach, 1993b).

Museum acronyms follow Leviton *et al.* (1985), except for the following: SLS = St. Louis School, Hong Kong; TNRC = Thai-

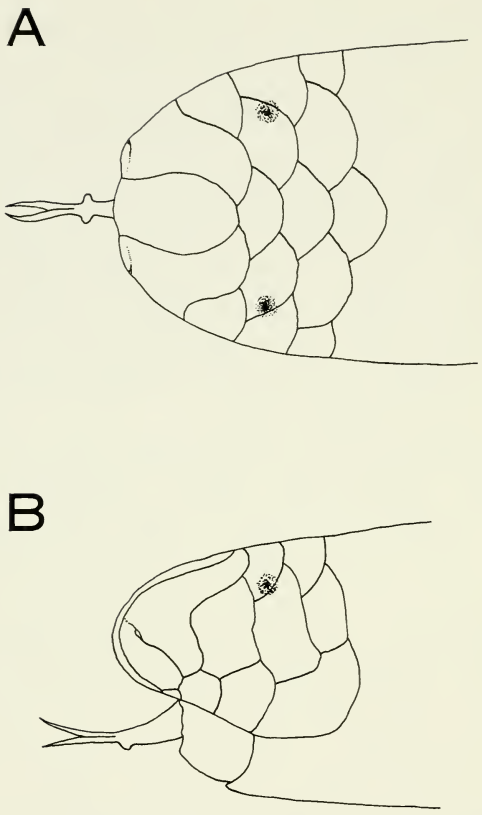

Figure 1. Head of the holotype of *Typhlops lazelli* (MCZ 173290). A, dorsal view; B, lateral view.

land National Reference Collection, Bangkok; ZRC = Zoological Reference Collection, Singapore National University, Singapore.

TAXONOMY

Typhlops lazelli, new species
Figure 1

Holotype. MCZ 173290, adult female collected by Sandra Brown (field no. Z-36266) on 27 May 1988.

Type Locality. High West, Pokfulam, Hong Kong Island, Hong

Kong Territory, China, ca. 22°15′30″N, 114°08′30″E (mapped by Lazell and Lu, 1990: fig. 1, locality 3).

Paratype. MCZ 183578 (ex-SLS), a juvenile male from Hong Kong University Campus, Hong Kong, Hong Kong Territory, China, collected by Michael Wai-Neng Lau on 10 December 1992.

Diagnosis. Typhlops lazelli can be distinguished from all other typhlopids of Asia except *T. porrectus* by the combination of 18 midbody scale rows and a T-V SIP. From *T. porrectus,* it is differentiated by a unicameral tracheal lung, absence of enlarged occipitals, and a projecting mental shield.

Etymology. This species is dedicated to James D. "Skip" Lazell in recognition of his exemplary studies of the herpetofauna of the Hong Kong environs. As one of the vanishing breed of 19th century naturalists, Skip is an arduous field worker, an exemplary systematist, and an expert on island biogeography. His many contributions to Caribbean and Chinese insular herpetology attest to his authority in the field. Although his writings may at times be acerbic and contentious, they are always honest, insightful, and entertaining.

Description of Holotype (Variation in Paratype Given Parenthetically). Adult female (juvenile male) with snout–vent length of 155.2 (91.1) mm, tail length of 2.8 (1.4) mm, total length 158.0 (92.5) mm, midbody diameter 1.9 (1.2) mm, midtail diameter 1.7 (0.8) mm, total length/midbody diameter ratio 83.2 (77.1), tail 1.8% (1.5%) of total length, tail length/tail width ratio 1.65 (1.75). Longitudinal scale rows 17-18-18 (17-18-18), total middorsals 427 (409), subcaudals 10 (9), dorsocaudals 9 (8). Three anal scales. Apical spine short and straight with stout base.

Head rounded in dorsal view, not distinct from the neck, with a truncated snout. Rostral oval, 0.32 (0.33) head diameter and slightly broader than supranasals, not reaching the level of the eyes, in contact with frontal that separates the supranasals middorsally. Frontal 2.0 (2.0) times as broad as long with rounded posterior border, smaller than supraoculars. Supraoculars transversely oriented, 1.5 times the size of costal or body scales. Parietals transverse, twice the size of the costals. Discretely enlarged occipitals lacking, subequal to costals in size. Postfrontal, inter-

parietal, and interoccipital larger and broader than frontal. Snout rounded in lateral view, supranasal broader than preocular with weak postnasal concavity. Nasal incompletely divided with inferior nasal suture contacting second supralabial. Superior nasal suture curving dorsomedially in an arc, extending 0.90 (0.67) of the nostril–rostral gap and just visible in dorsal view. Nostril closer to rostral than preocular, directed laterally, its axis oriented at 45°. Ocular subequal in size but slightly narrower than preocular. Eye barely visible as a vague pigmented spot (discrete eyespot) beneath the ocular–supraocular suture near the supraocular–precular junction. One postocular. Four supralabials, T-V SIP with both the second and third supralabials overlapping the shields above them. First supralabial half the size of second, second supralabial two-thirds the size of third, and third supralabial one-half the size of fourth. Mental not projecting beyond curvature of lower jaw. Three scales border cloacal opening. Tail with abrupt taper near tip. Apical spine lacking, tail terminus covered by an obtusely pointed cone. An anomalous condition in the paratype is the partial fusion, on both sides of the head, of the dorsolateral portion of the postnasal with the preocular and the preocular with the ocular.

Cephalic glands confined to sutures between scales. One pair of lateral tongue papillae present just proximal to level of bifurcation of lingual tips.

Middorsal nine scale rows pigmented lightly brown with a darker brown spot covering anterior $\frac{1}{4}$–$\frac{1}{5}$ of scale; midventral nine rows lightly stippled in brown with white background and outer margins. Anterior snout (most of rostral, nasals, peroculars, oculars, and labials), chin, and throat white; a median longitudinal white bar occurs on throat of holotype. Rostral of holotype white with central brown bar; in paratype the entire rostral is brown. Ventrally, the cloacal region to tail tip white. Paratype with a few scattered midventral white scales.

Internal anatomy (female holotype data first and, if different, male paratype data second). Sternohyoideus posterior tip 7.4, 9.3%, sternohyoideus–heart gap 0.74, 0.71. Heart 3.2, 3.6% (MP 30.0, 33.5%), systemic arch gap/heart length ratio 0.20, 0.15. Snout–heart interval 31.6, 35.2%, heart–liver gap absent (0,

−0.3%) with anterior tip of left liver lobe just touching (overlapping) the posterior tip of ventricle. Liver tightly coiled, 19.4, 25.7% (MP 45.2, 50.5%), left anterior lobe extends beyond right by 0.10, 0.17 liver length, right posterior tail extends beyond left by 0.44, 0.47 liver length, left liver/right liver ratio 0.63, 0.61. Right liver segments 17, 15, left liver segments 12, 10, total liver segments 29, 25. Liver–gall bladder gap 7.7, 9.3%, liver–gall bladder interval 35.8, 28.4%. Gall bladder 1.3, 0.8% (midpoint 63.2, 73.1%) located between spleen and pancreas, spleen (1.0%) craniad of and separated from the pancreas (1.0%). Right ovary 2.3% (MP 70.8%) with 6 follicles, left ovary 2.3% (MP 75.6%) with 4 follicles. Testes unipartite, right testis 2.2% (MP 76.5%), left testis 2.2% (MP 79.8%). Right adrenal MP 85.1, 85.9%, left adrenal MP 86.7, 87.8%. Liver–kidney gap, 28.4, 21.9%, liver–kidney interval 58.7, 57.4%. Kidneys not segmented but with dark striations, each with a single renal artery, right kidney 3.9, 3.6% (MP 85.2, 87.0%), left kidney 3.9, 3.3% (MP 88.4, 90.7%), kidney–vent interval 16.8, 14.8%, kidney–vent gap 9.7, 7.7%. Elongate rectal caecum present (1.6, 0.8%), twice the diameter of adjacent intestine, caecum–vent interval 10.0, 6.3%. Caecum/left kidney ratio 0.41, 0.24.

The tracheal lung, cardiac lung, and right lung are unicameral; tracheal organ with 34 transverse septa forming incipient paucicameral cells, each with septa twice the height of the faveoli. Left lung complex absent. Trachea 31.0, 34.2% (MP 16.1, 18.2%) possessing short tips on cartilaginous rings, numbering an estimated 240, 279 rings (rings/10% SVL = 77.5, 82.4). Tracheal lung 19.3, 25.1% (MP 18.7, 19.1%), saccular with 34 transverse blood vessels serving it. Anterior tip of parenchyma 9.0, 6.6%; posterior tip of parenchyma 40.6, 41.5%. Tracheal membrane/trachea ratio large, 3.0 posteriorly, 4.0 at midneck, and 1.0 anteriorly. Right lung 18.7, 161.% (MP 41.0, 43.3%), poorly vascularized with very large ediculae in cranial portion, caudal portion (9.7, 9.8%) with large trabeculae, posterior lung tip at 50.3, 51.4%. Right bronchus 9.0, 10.1%, bronchus/right lung ratio 0.48, 0.63, right lung/tracheal lung ratio 0.96, 0.64, total lung 41.3, 44.8% (MP 29.0, 29.7%).

Organ midpoint segments include heart–right lung segment

(11.0, 9.8%), heart–liver segment (15.2, 17.0%), trachea–liver segment (29.1, 32.3%), heart–right lung segment (40.8, 43.0%), liver–kidney segment (41.6, 38.4%), trachea–bronchus—gall bladder segment (42.6, 49.9%), right lung–adrenal segment (44.9, 43.6%), heart–kidney segment (56.8, 55.4%), trachea–bronchus—kidney segment (66.2, 65.7%), and trachea–adrenal segment (69.8, 68.7%).

Ecology. The only specimens found thus far were removed from leaf litter in a concrete drainage ditch into which they were presumably washed by rain from the forested slopes above the drain. Most upland areas of Hong Kong Island are covered in richly wooded forest today, often with large trees (Herklots, 1951). These areas have been protected as a country park to insure sufficient watershed for the island's reservoirs (J. D. Lazell, personal communication).

It is perhaps surprising that *T. lazelli* has not been found on any other of the more than 100 islands of Hong Kong, or on the New Territories mainland. However, few areas exist anywhere in tropical China today as well forested as the uplands of Hong Kong Island (J. D. Lazell, personal communication). Indeed, pythons, cobras, and ratsnakes, in addition to many smaller species of snakes, are common on the island (Karsen *et al.*, 1986). If the forest is the natural home of *T. lazelli,* then its future would appear to be secure. Our ability to obtain further specimens will depend upon luck and the cooperation of local residents in searching drain gutters.

DISCUSSION

All seven currently recognized typhlopid genera are found in the Old World (*Acutotyphlops, Cyclotyphlops, Ramphotyphlops, Rhinotyphlops, Typhlops, Xenotyphlops,* and *Grypotyphlops* Peters, 1881 [resurrected for "*Rhinotyphlops*" *acutus* by Wallach, 2003]), with six occupying or extending into Asia. Among the 150 species of Typhlopidae examined thus far, no species of *Acutotyphlops, Cyclotyphlops, Grypotyphlops, Ramphotyphlops, Rhinotyphlops,* or *Xenotyphlops* has a unicameral tracheal lung but nine species of *Typhlops* possess it: two African (*T. caecatus* and *T. zenkeri*), three Asian (*T. depressiceps, T. hedraeus,* and *T.*

mirus), and four American (*T. monensis, T. pusillus, T. rostellatus,* and *T. schwartzi*) (Wallach, 1998b).

The T-V SIP of *T. lazelli* is consistent only with the genus *Typhlops*. The other six genera are separable on the following characters: *Acutotyphlops* has a T-0 or T-III SIP, 26–36 midbody scale rows, fragmentation of head shields, and a pointed snout; *Cyclotyphlops* has a T-III SIP, 22 scale rows, and a floral pattern of head scales; *Grypotyphlops* has a T-0 SIP and 24–34 scale rows; *Ramphotyphlops* has a T-III SIP; *Rhinotyphlops* has a T-0 or T-II SIP; and *Xenotyphlops* has a T-0 SIP. *Typhlops* may have any of the possible imbrication patterns (T-0, T-II, T-III, or T-V).

It was previously believed that presence of lateral tongue papillae was a diagnostic feature of certain *Ramphotyphlops*. McDowell (1974) listed 10 species of *Ramphotyphlops* and only one of *Typhlops* (*Typhlops* [= *Grypotyphlops*] *acutus*) that possess lingual papillae (plus a few *Ramphotyphlops* species that either lacked papillae or were variable). Wallach (1998b) reported papillae in three additional *Ramphotyphlops,* two *Rhinotyphlops,* and 12 additional *Typhlops*. Thus, the presence of papillae is not confined to a particular genus and is uninformative.

The T-V SIP and unicameral tracheal lung are compelling evidence for placement in *Typhlops* versus *Ramphotyphlops*. *Typhlops lazelli* appears to be allied to the *Typhlops porrectus* species group of southern and eastern Asia. However, a comparison with all Asian species groups in these two genera follows.

1. The *Ramphotyphlops braminus* species group contains only *R. braminus* (Daudin, 1803), the parthenogenetic "flowerpot" species that is distributed worldwide. It differs from *T. lazelli* in having 20 scale rows, superior nasal suture extending onto dorsum of snout, inferior nasal suture contacting preocular, and a T-III SIP.

2. The *Ramphotyphlops lineatus* species group is also monotypic, with *R. lineatus* (Schlegel, 1839) as its sole member. It differs from *T. lazelli* in having 22–24 scale rows, a T-III SIP, inferior nasal suture contacting first supralabial, striped color pattern, and in lacking a visible eye.

3. *Typhlops marxi* Wallach (1994), currently a monotypic member of the *T. marxi* species group, may actually belong to

the long-tailed *Ramphotyphlops multilineatus* species group: *R. cumingii* (Gray, 1845), *R. multilineatus* (Schlegel, 1839), and *R. olivaceus* (Gray, 1845). Two of the species are Philippine, and other than the T-0 SIP, *T. marxi* agrees most closely with *R. cumingii* in having a high number of midbody scale rows (30), total middorsals (525), and subcaudals (36), in addition to a keeled rostral and relatively long tail (6% total length) (Wallach, 1994). If so included, *T. marxi* would be the only *Ramphotyphlops* with a T-0 SIP; however, an identical situation is seen in *Acutotyphlops,* where three of the four species—*A. infralabialis* (Waite, 1918), *A. kunuaensis* Wallach, 1995, and *A. solomonis* (Parker, 1939)—have a T-III pattern, with *A. subocularis* (Waite, 1897) having a T-0 SIP. Therefore, we suggest the transfer of *T. marxi* to the *R. multilineatus* species group as *Ramphotyphlops marxi* (Wallach, 1993a) comb. nov. Members of this group can be separated from *Typhlops lazelli* by their midbody scale rows (20–30), long tails (3–9% total length), and pointed snouts with angular rostral edges.

4. The *Typhlops ater* species group (*sensu* Wallach, 1996) is characterized by cephalic glands distributed beneath the central regions of head shields (in addition to peripherally, as in all other typhlopids), a T-II or T-V SIP, broad rostral, nasal usually divided, and absence of a rectal caecum. This species group contains the following 15 species: *T. andamanensis* Stoliczka, 1871; *T. ater* Schlegel, 1839; *T. beddomii* Boulenger, 1890; *T. bisubocularis* Boettger, 1893; *T. ceylonicus* Smith, 1943; *T. depressiceps* Sternfeld, 1913; *T. floweri* Boulenger *in* Flower, 1899; *T. fredparkeri* Wallach, 1997; *T. hedraeus* Savage, 1950; *T. inornatus* Boulenger, 1888; *T. mcdowelli* Wallach, 1997; *T. mirus* Jan, 1863; *T. oligolepis* Wall, 1909a; *T. thurstoni* Boettger, 1890; and *T. tindalli* Smith, 1943. Most mainland Asian species have 18 scale rows, whereas species from the East Indies have from 16 to 24 midbody rows.

In addition to the above characters of the *T. ater* group that distinguish all species from *T. lazelli,* the following species with a T-V SIP can be further differentiated as follows: *T. depressiceps* has 20–24 midbody scale rows, more than 630 middorsals, more than 20 subcaudals, and a hooked snout; *T. floweri* has more than

475 middorsals, a subocular, 20 or more subcaudals, and a multicameral lung; *T. inornatus* has 20–22 scale rows and a subcular; and *T. mcdowelli* has 22–24 scale rows, 17 or more subcaudals, and a rostral beak.

5. The *Typhlops diardii* (*sensu* McDowell, 1974; Wallach, 2001) species group, characterized by 20–30 midbody scale rows, a T-V SIP, broad rostral, nasal incompletely divided, large pedunculate rectal caecum, and a short tail that is broader than long, contains 11 species: *T. bothriorhynchus* Günther, 1864; *T. diardii* Schlegel, 1839; *T. giadinhensis* Bourret, 1937; *T. hypsobothrius* Werner, 1917; *T. klemmeri* Taylor, 1962; *T. koshunensis* Oshima, 1916; *T. muelleri* Schlegel, 1839; *T. oatesii* Boulenger, 1890; *T. roxaneae* Wallach, 2001; *T. siamensis* Günther, 1864; and *T. trangensis* Taylor, 1962. All of these species are clearly separable from *T. lazelli.*

6. The primarily Philippine *Typhlops ruficaudus* species group (*sensu* McDowell, 1974), with a strongly contrasting bicolor pattern (dark dorsum and light venter), 24–30 midbody scale rows, a T-III SIP, and vestigial or absent rectal caecum, contains seven species: *T. castanotus* Wynn and Leviton, 1993; *T. collaris* Wynn and Leviton, 1993; *T. fuscus* Duméril and Bibron, 1844; *T. kraali* Doria, 1874; *T. ruber* Boettger, 1897; *T. ruficaudus* (Gray, 1845); and *T. suluensis* Taylor, 1918. They all are easily distinguishable from *T. lazelli* by the characters above.

7. The *Typhlops pammeces* species group (previously referred to as the "*Ramphotyphlops*" *braminus* species group by Wallach, 1993a) with 20 scale rows (22 in *T. leucomelas*), T-III SIP, narrow rostral, and divided nasal with superior nasal suture visible dorsally, has 10 members: *T. conradi* Peters, 1874; *T. jerdoni* Boulenger, 1890; *T. khoratensis* Taylor, 1962; *T. lankaensis* Taylor, 1947; *T. leucomelas* Boulenger, 1890; *T. malcolmi* Taylor, 1947; *T. pammeces* Günther, 1864; *T. tenebrarum* Taylor, 1947; *T. veddae* Taylor, 1947; and *T. violaceus* Taylor, 1947. The validity of some of Taylor's species is uncertain and A. H. Wynn currently is studying them. All of these species are distinguishable from *T. lazelli* by the above suite of characters. Two *Ramphotyphlops* species, *R. albiceps* Boulenger, 1898, and an undescribed form from Thailand, also have been associated with this group.

Although superficially similar, both have the characteristic hemipenes of *Ramphotyphlops* in addition to 20 scale rows, a T-III SIP, and a nasal suture extending onto dorsum of snout. The hemipenis type of Sulawesi *Typhlops conradi* is unknown and it may be a *Ramphotyphlops,* because it closely resembles *R. albiceps.*

8. The remaining Asian assemblage is the *Typhlops porrectus* species group (*sensu* Wallach, 1999), characterized by 18 scale rows, a narrow rostral, and a tail that is longer than broad. All examined species except *T. porrectus* have a paucicameral tracheal lung. It contains at least six species: *T. exiguus* Jan, 1864; *T. filiformis* Duméril and Bibron, 1844; *T. loveridgei* Constable, 1949; *T. meszoelyi* Wallach, 1999; *T. porrectus* Stoliczka, 1871; and *T. schmutzi* Auffenberg, 1980. A number of uncertain names (*T. ahsanuli* Khan, 1999b; *T. ductuliformes* Khan, 1999a; *T. mackinnoni* Wall, 1909b; *T. m. madgemintonae* Khan, 1999b; *T. m. shermani* Khan, 1999b; and *T. venningi* Wall, 1913) may or may not be valid but appear to be related to *T. porrectus* (Wallach, 1999, 2000). The group may be polyphyletic because it includes species with T-II, T-III, and T-V SIPs, the SIP usually diagnostic of species groups or even genera as previously mentioned. Work in progress by A. H. Wynn will hopefully establish the content and relationships of the species in this group. *Typhlops lazelli* is compared to other Asian *Typhlops* species having 18 scales and a T-V SIP in Table 1.

Typhlops lazelli can be separated from *T. porrectus,* which it closely resembles in having 18 scale rows, a T-V SIP, a narrow rostral, an incomplete superior nasal suture, lateral tongue papillae, and similar coloration, by its smoothly contoured mental shield (vs. projecting) and lack of enlarged occipitals (vs. occipitals 1.5–2.0 times costal width). More significantly, *T. lazelli* also can be separated from *T. porrectus* by its unicameral tracheal lung; *T. porrectus* possesses a multicameral tracheal lung with 17–24 type C foramina. No evidence exists that the tracheal lung structure changes ontogenetically such that a unicameral lung transforms into a paucicameral and eventually into a multicameral lung (Wallach, 1998b). Neonates and juveniles of large-sized species that have multicameral lungs exhibit the same structure, in miniature, as adults. Examples of such cases from three different

TABLE 1. COMPARISON OF *TYPHLOPS LAZELLI* WITH ASIAN *TYPHLOPS* SPECIES HAVING 18 SCALE ROWS AND A *T-V* SUPERALABIAL IMBRICATION PATTERN.[a]

Species	*n*	TMD	SC	LOA	L/W	PTO	SO	RW	OC
T. lazelli	2	409–427	9–10	92–158	77–83	1	0	0.30–0.33	0
T. porrectus	8	388–468	7–12	65–285	50–90	1–2	0	0.30–0.41	+
T. "ductuliformes"	1	412–461	10	92–206	57–108	1	0	0.30–0.33	+
T. "ductuliformes"	0	336–342	7–10	120–200	62–130	1	0	0.44	+
T. "madgemintonae"	1	348	12	135–196	60–78	1	0	0.30	+
T. exiguus	1	389	8	121	60	1	0	0.33	+
T. filiformis	3	478–520	20–23	174–230	62–89	2–3	1	0.49	+
T. floweri	3	403–413	9–12	58–140	70–93	1	0	0.33	+
T. schmutzi									

[a] *n* = specimens examined; TMD = total middorsals; SC = subcaudals; LOA = total length (mm); L/W = total length/midbody diameter; PTO = postoculars; SO = suboculars; RW = rostral/head width; OC = occipitals enlarged (+ = yes, 0 = no).

genera include dissections of specimens with the following total lengths: *T. bibronii* (117 mm vs. 356 mm), *T. congestus* (204 mm vs. 528 mm), *T. jamaicensis* (102 mm vs. 302 mm), *T. lineolatus* (120 mm vs. 302 mm), *T. muelleri* (116 mm vs. 369 mm), *T. punctatus* (168 mm vs. 379 mm), *T. ruficaudus* (127 mm vs. 367 mm), *Ramphotyphlops albiceps* (124 mm vs. 296 mm), *Ram. nigrescens* (140 mm vs. 281 mm), *Ram. olivaceus* (163 mm vs. 358 mm), *Rhinotyphlops mucruso* (120 mm vs. 743 mm), and *Rhi. schlegelii* (144 mm vs. 447 mm). All of these specimens have multicameral tracheal lungs of the same form in both the juveniles and adults. The difference between a unicameral and multicameral lung is morphologically significant; no species has yet been observed to exhibit more than a single lung type (unicameral, paucicameral, or multicameral). There can thus be no doubt about the validity of *Typhlops lazelli.*

The following keys will aid in the identification of Chinese and Hong Kong Typhlopidae.

Key to Hong Kong Species of Typhlopidae

1a. Inferior nasal suture contacting preocular, eye distinct with pupil, head brown . . . . . *R. braminus*
1b. Inferior nasal suture contacting second supralabial, eyespot indistinct, snout white 2
2a. Supralabial imbrication pattern T-III, 20 scale rows, entire head and nape white or yellow plus subcaudals and tail tip . . . . . *R. albiceps*
2b. Supralabial imbrication pattern T-V, 18 scale rows, snout, chin, and throat white plus subcaudals . . . . . *T. lazelli*

Key to Chinese Species of Typhlopidae

1a. Supralabial imbrication pattern T-III (*Ramphotyphlops*) 2
1b. Supralabial imbrication pattern T-V (*Typhlops*) 3
2a. Scale rows 20, head brown, inferior nasal suture to preocular *R. braminus*
2b. Scale rows 18, head yellow or white, inferior nasal suture to second supraabial . . . . . *R. albiceps*
3a. Scale rows 18, middorsals greater than 400, length/width ratio greater than 60, one postocular . . . . . *T. lazelli*
3b. Scale rows 22 or more, middorsals fewer than 350, length/width ratio less than 50, two postoculars 4
4a. Scale rows 22 (23), middorsals fewer than 250 (Taiwan) . . . *T. koshunensis*
4b. Scale rows 24–28, middorsals greater than 260 (China) . . . . . *T. diardii*

Recent summaries of native Hong Kong reptiles and amphibians reveal slightly different figures. Karsen *et al.* (1986, 1998) listed 99 total species, whereas Lazell (1999) reported only 90 species, including five endemics. Of this number, Karsen *et al.* (1986) listed 47 snakes, Karsen *et al.* (1998) listed 49 snakes, and Lazell (1999) listed 38 snakes; all agreed that two species are endemic. The presence of *T. lazelli* increases the number of native Hong Kong snakes to either 39 or 50, with three endemic species. Lazell (1999) hypothesized a Cathaysian origin for *T. koshunensis* from Taiwan, a Sundaland origin for *T.* (= *Ramphotyphlops*) *albiceps* of Southeast Asia, and unknown origins for *T.* (= *Ramphotyphlops*) *braminus* and *T. diardii*. *Ramphotyphlops braminus*, with many similar species in India and Southeast Asia, would appear to have a western origin. Because *T. diardii* also occurs throughout Southeast Asia, it could have a southern or western origin. *Typhlops lazelli*, as a member of the *T. porrectus* group, would have a western origin.

MATERIAL EXAMINED

Cyclotyphlops deharvengi (MNHN 1990.4279 [holotype]), *Ramphotyphlops albiceps* (BMNH 1946.1.10.50 [holotype], 1954.1.13.4, 1983.946; MCZ 181196, 177983; SLS 196; ZMUC 52203–04; ZRC 2.3043–45), *R. ozakiae* (FMNH 180003–06 [paratypes], 180007 [holotype]), *Typhlops ater* (FMNH 142108; MCZ 33505; NMBA 979; ZMA 17737), *T. beddomii* (MCZ 3913, 3929, 22372, 175867; FMNH 217694), *T. bisubocularis* (USNM 43455), *T. bothriorhynchus* (UF 48813), *T. castanotus* (CAS 127973; CAS-SU 27942; MCZ 25594), *T. ceylonicus* (BMNH 1946.1.11.62 [holotype]), *T. collaris* (UF 54186, 68443), *T. conradi* (ZMB 7934 [holotype]), *T. depressiceps* (MCZ 145954; USNM 195953; ZMB 23986 [holotype]), *T. diardii* (CAS-SU 13982; FMNH 180008, 180023, 252064; MCZ 165004; ROM 25640), *T. exiguus* (ZMB 50030), *T. filiformis* (MNHN 929 [holotype]), *T. floweri* (CAS 101599; MCZ 181198; NMBA 328), *T. fredparkeri* (MCZ 142651 [holotype]), *T. fuscus* (MNHN 1062 [holotype]), *T. hedraeus* (MCZ 17578; USNM 229285, 498958), *T. inornatus* (MCZ 140724, 140728, 175100; UPNG 8572), *T. jerdoni* (ZMUC 52121), *T. khoratensis* (MCZ

74097), *T. klemmeri* (FMNH 178238 [holotype]), *T. kraalii* (ZMA 14225), *T. lankaensis* (FMNH 100134 [paratype]), *T. leucomelas* (BMNH 1946.1.10.46 [holotype]), *T. lazelli* (MCZ 173290 [holotype]; MCZ 183578 [paratype]), *T. loveridgei* (MCZ 2283 [holotype]), *T. malcolmi* (FMNH 100132 [paratype]; ZMH 3967), *T. marxi* (FMNH 96520 [holotype]), *T. mcdowelli* (UPNG 7502 [holotype]; PNGM 24604 [paratype]), *T. meszoelyi* (FMNH 191888 [paratype], 191889 [holotype]), *T. mirus* (FMNH 123533–34; MCZ 18377–78; NHRM 3350), *T. muelleri* (BPBM 2156; CAS 222410; FMNH 161275, 252063; IRSNB 16535; TNRC 3788, 7336–37; USNM 86885), *T. pammeces* (BMNH 1946.1.11.34 [holotype]; CM 90600; MCZ 5229; USNM 193298), *T. porrectus* (CAS 17169; FMNH 60645, 217449; MCZ 3702, 4082, 165023–24; NHRM 5529, UMMZ 123429 [paratype of *T. ductuliformes*]), *T. roxaneae* (MCZ 177984 [holotype]), *T. ruber* (CAS 182566; FMNH 53223; MCZ 79698), *T. ruficaudus* (CAS 135667; CAS-SU 19517, 21066, 26815; UF 54652), *T. schmutzi* (UF 29452, 29528, 37018 [paratypes]), *T. siamensis* (MCZ 16655; TCWC 29356), *T. tenebrarum* (FMNH 120237–38 [paratypes], 167012; NHRM 31445a), *T. trangensis* (FMNH 178236 [holotype]; NMV 1914), *T. veddae* (FMNH 100033 [holotype]), *T. violaceus* (FMNH 100068 [holotype], 124231).

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